

Monopoly

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Overview

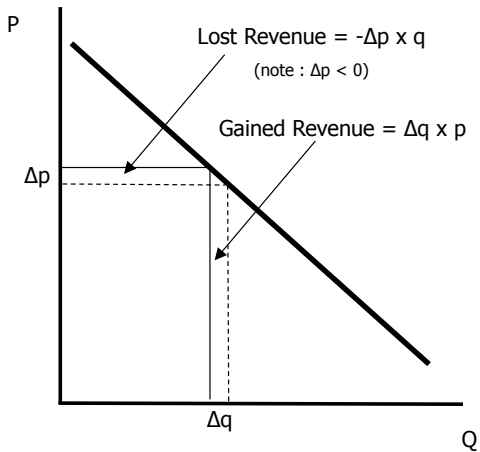
Definition: A firm is a monopoly if it is the **only** supplier of a product in a market. A monopolist's demand curve slopes down because firm demand equals industry demand.

Five cases:

- 1 Base Case (One price, perishable good, non-IRS Costs).
- 2 Natural Monopoly
- 3 Price Discrimination
- 4 Bundling
- 5 Durable Goods

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Base case: Revenue



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Base case: Revenue

Demand Curve Facing Monopolist ($MC = 0$). Decreasing price by Δp reduces revenue on the inframarginal unit, but increases revenue on the extra marginal unit.

Which revenue effect is larger?

$$\text{Revenue} = P * Q$$

Is the % decrease in P greater or less than the % increase in Q ?

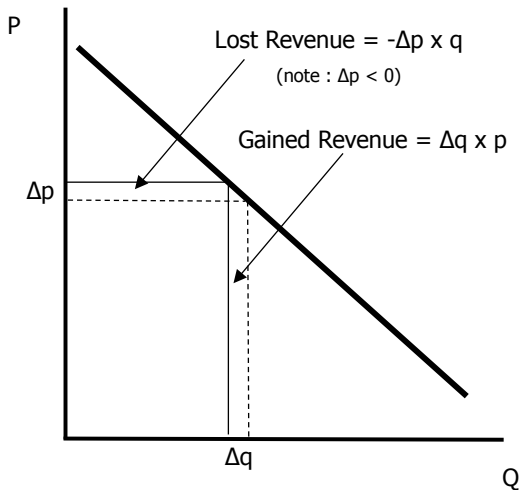
It depends on the price elasticity of demand:

$$\varepsilon_d = \frac{P}{Q} \frac{dQ}{dP}$$

Moving toward the point where $\varepsilon_d = -1$ increases total revenue.

Monopoly

Base case: Revenue



Given a price drop,
revenue increases if

Gain > Loss

$$\Delta q \times p > -\Delta p \times q$$

$$p\Delta q > -q\Delta p$$

Which implies:

$$(p\Delta q)/(q\Delta p) < -1$$

$$\varepsilon < -1$$

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Base Case: Linear Demand

What does Marginal Revenue look like? Denote the inverse demand curve by $P(Q)$. We consider simple linear demand curves here:

$$Q = a - bP$$

$$\begin{aligned} P &= \frac{a}{b} - \frac{1}{b}Q \\ &\equiv A - BQ \end{aligned}$$

Total revenue is:

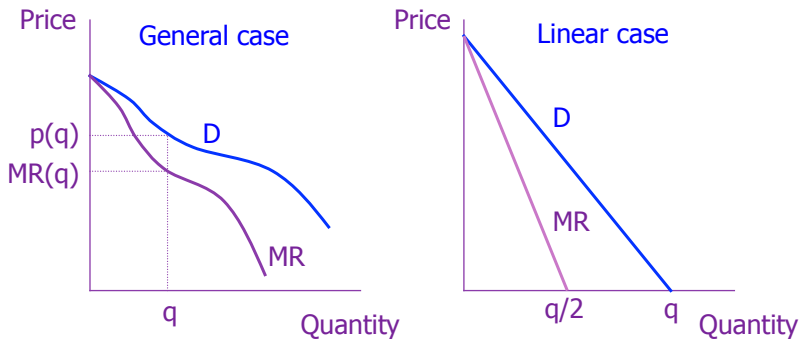
$$\begin{aligned} PQ &= (A - BQ)Q \\ &= AQ - BQ^2 \end{aligned}$$

Differentiate to get marginal revenue:

$$MR = \frac{dR}{dQ} = A - 2BQ$$

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Base Case: Linear Demand



Marginal revenue is less than price

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Base Case: Profit Maximization

Monopolist's Profit Maximization Problem:

$$\max_Q \pi = P(Q)Q - C(Q)$$

(Choosing P or Q makes no difference because we are selecting a single point on the demand curve. This will not be true when we consider oligopoly problems.)

F.O.C. are:

$$\frac{d\pi}{dQ} = P(Q) + Q \frac{dP}{dQ} - \frac{dC}{dQ} = 0$$

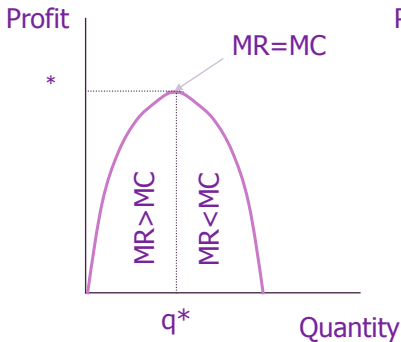
$$\implies P(Q) + Q \frac{dP}{dQ} = \frac{dC}{dQ}$$

$$\implies MR = MC$$

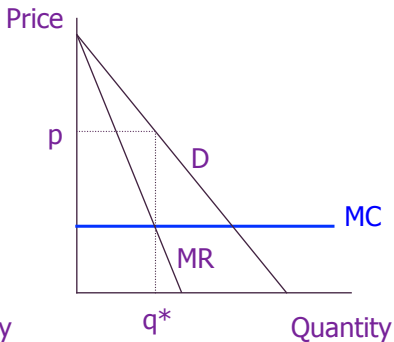
(P^*, Q^*) is profit-maximizing choice.

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Base Case: Profit Maximization



Increase q if $MR > MC$
Decrease if $MR < MC$



At optimum, $MR=MC$

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Base Case

Note that Marginal Revenue may be written:

$$MR = \frac{dR}{dQ} = \frac{d[P(Q)Q]}{dQ} = P + \frac{dP}{dQ} Q$$

$$P + \frac{dP}{dQ} \frac{PQ}{P} = P \left(1 + \frac{1}{\varepsilon_d} \right)$$

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Base Case

Inverse Elasticity Rule for Monopolist:
Price Cost Margin, Markup, or Lerner Index is:

$$L = \frac{P - MC}{P}$$

The monopolist chooses output such that the markup equals the inverse of the elasticity of demand:

$$\begin{aligned} \frac{P(Q) - \frac{dC(Q)}{dQ}}{P(Q)} &= \frac{-Q \frac{dP(Q)}{dQ}}{P(Q)} \\ &= \frac{-Q}{P} \frac{dP(Q)}{dQ} \\ &= \frac{1}{-\varepsilon_d} > 0 \end{aligned}$$

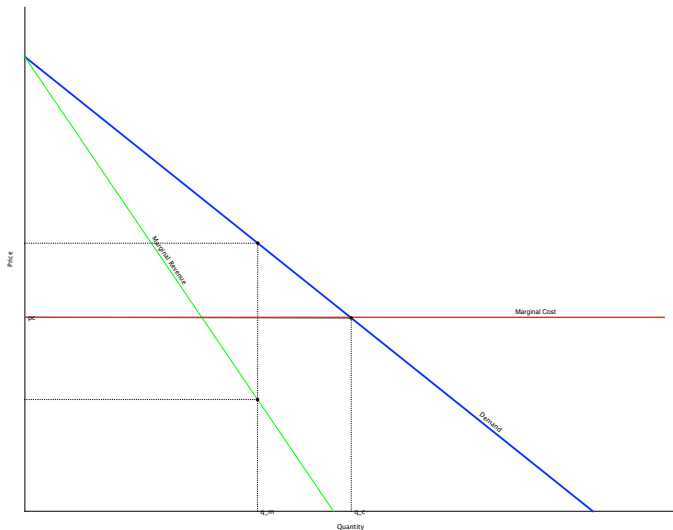
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Base Case: Welfare and Efficiency

- What is the welfare impact of monopoly?
 - Graphically
 - Algebra
- What is the reason that there is DWL?

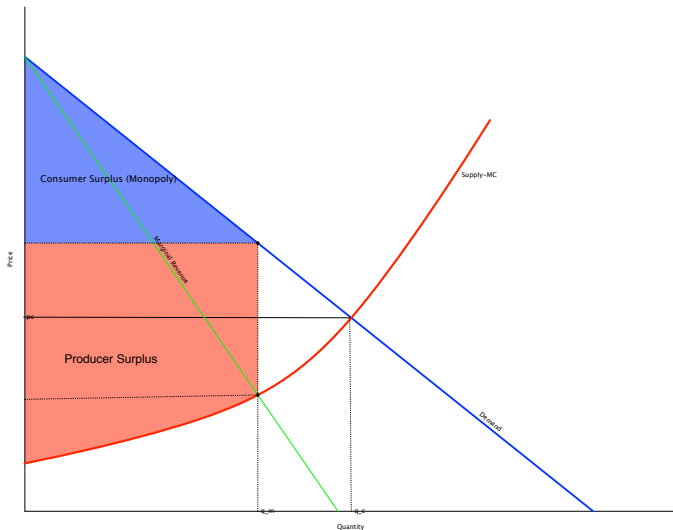
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Base Case: Graphically



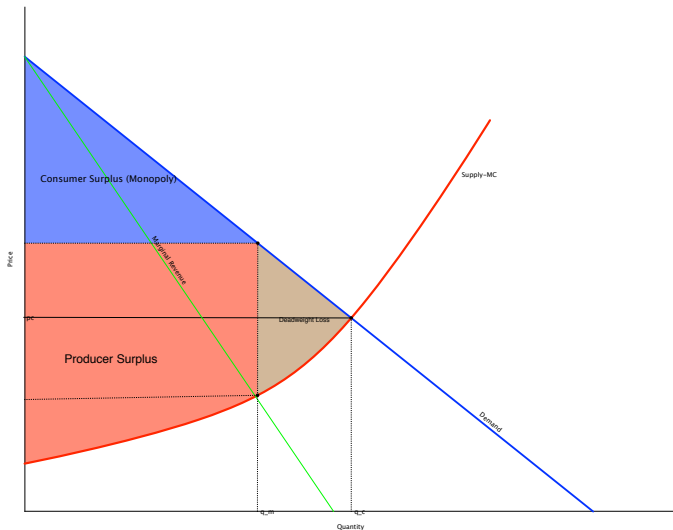
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Base Case: Graphically



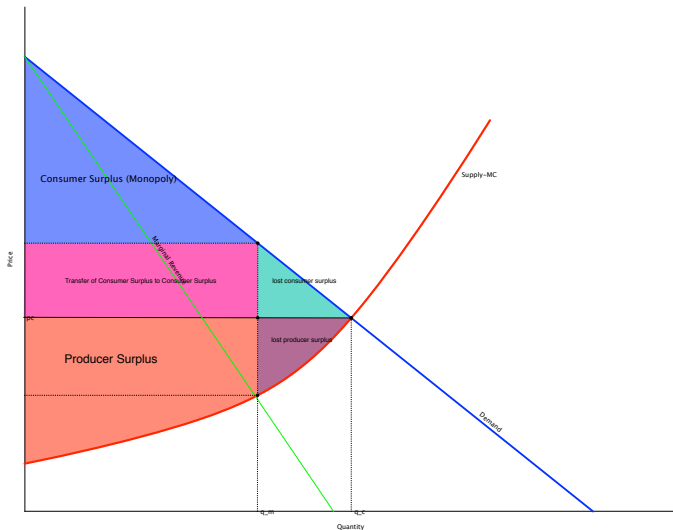
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Base Case: Graphically



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Base Case: Graphically



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Base Case: Summary

To Reiterate: The Pricing Rule of A Monopolist Is:

- $$MR = P \left(1 + \frac{1}{-|\varepsilon_d|} \right) = MC$$

- or equivalently:

$$\frac{P - MC}{P} = \frac{1}{-\varepsilon_d}$$

Flatter demand implies higher ε_d holding P and Q fixed, a lower monopoly markup and lower DWL.

Monopoly

Base Case: Summary

Monopolists induce inefficient rent-seeking behavior and monopoly profit is a transfer from consumers.

But: there are benefits to monopoly: Incentives to innovate (new products, more efficient production).